

- (21) Application No 8012894
(22) Date of filing 18 Apr 1980
(30) Priority data
(31) 23596
(32) 15 Jun 1979
(33) Italy (IT)
(43) Application published
28 Jan 1981
(51) INT CL³
B32B 3/30 25/10 31/20
(52) Domestic classification
B5N 0330 2510 3120
(56) Documents cited
GB 1406709
GB 1338830
GB 1322737
GB 1278940
GB 1269216
GB 1194883
GB 1072891
(58) Field of search
B5N
(71) Applicants
A G A Articoli Gomma
Affini SpA,
Piazza Duca d'Aosta 3,
Milano,
Italy.
(72) Inventors
Italo Strafurini
(74) Agents
R. E. S. Waller

(54) Process for the manufacture of mats for motor vehicles and mats obtained thereby

(57) A process for making a mat for motor vehicles comprises assembling a layer of textile material (6) and a layer of elastomeric material (5) and subjecting the assembly to compression and heat to vulcanise the elastomeric material. During this process, some of the fibres comprising the textile layer can become sintered. The exposed surface of the elastomeric material may be covered by a further layer of an expandable material covered in turn by a thermoplastic film.

The mats may be provided with a relief design (8,9) on the exposed surface (7) of the textile material to give a three-dimensional effect.

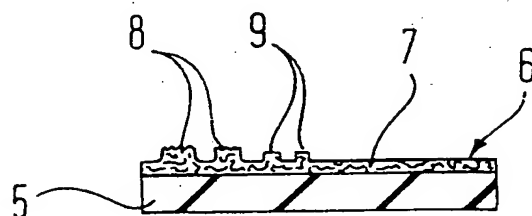


FIG.3

2052385

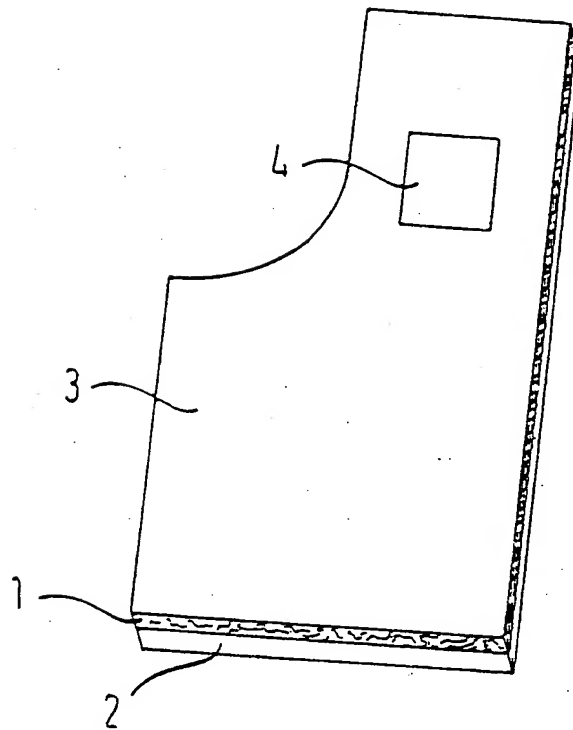


FIG. 1

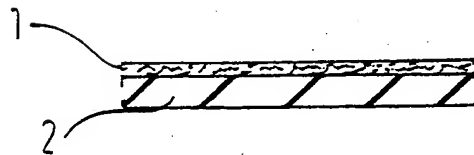


FIG. 2

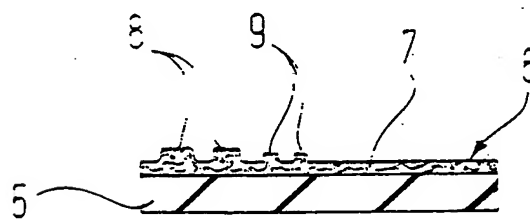


FIG. 3

SPECIFICATION

Process for the manufacture of mats for motor vehicles and mats obtained thereby

5 The present invention relates to a process for manufacturing mats for motor vehicles, including over-mats and sound-proofing mats, of the type wherein the surface which will be visible when the
10 mat is fitted comprises a layer of a textile material.

The present invention also relates to mats for motor vehicles obtained by means of the process in accordance with the present invention.

Known mats for motor vehicles can be divided into
15 two principal categories, i.e. mats wherein the surface which will be visible when the said mats are fitted in the vehicles comprises a layer of a textile material and those wherein the surface which is visible when fitted in the vehicles comprises a layer
20 of an elastomeric material.

In the case of mats for motor vehicles where the visible surface comprises a layer of a textile material, some known processes include the stage of glueing, to a part of the mat consisting of an already-
25 vulcanised elastomeric material or plastics material, a layer of a textile material which can be, for example, a non-woven fabric or a tufted fabric, either with a cut or uncut pile.

Other processes for manufacturing mats for motor
30 vehicles wherein the visible surface comprises a layer of a textile material include the stage of coating one surface of the fabric with a layer of a plastics material, followed by a stage of hot-moulding the complete assembly in order to give the mats a
35 three-dimensional configuration.

The known processes for manufacturing mats for motor vehicles wherein the surface which will be visible when the mat is fitted consists of a textile material are complex and give rise to mats having
40 several disadvantages.

One disadvantage of such known mats is the fact that they are light in weight, which results in poor sound insulation, and in order to overcome this problem, the known mats of a textile material
45 require to be attached to heavy layers, generally applied to the body of the vehicle, with a consequent high number of constituted elements and operative stages in connection with their application.

Another disadvantage of the known mats is the
50 high degree of wear to which the textile layer is subjected in use, which means that the mat soon has to be discarded.

In order to overcome the aforesaid disadvantages it has been proposed to apply to those areas of the
55 said mats subject to most wear, strips of a plastics material or an already-vulcanised elastomeric material and therefore, in this way, the process of manufacturing the said mats includes an additional stage, i.e. that of thermo-welding the strips to the
60 textile surface of the mat.

The aim of the present invention is a process for manufacturing mats for motor vehicles having a layer of textile material on the surface which will be visible when the mat is fitted, which is extremely
65 simple and which produces mats provided with an

extremely wear-resistant textile layer and which have a sound absorbent capacity equal to that of the best of the known mats, together with an arbitrarily variable sound insulating capacity.

70 Thus, the present invention provides a process for the manufacture of mats for motor vehicles, the process comprising the following stages:

- assembling a layer of a textile material together with a layer of a crude elastomeric material

75 - subjecting the assembly to compression and heat in order to vulcanise the layer of crude elastomeric material.

The present invention also provides a mat for motor vehicles, comprising a layer of a textile
80 material laminated to a layer of an elastomeric material, in which the layer of textile material has at least part of its component fibres in a sintered condition (as hereinafter defined).

The present invention will be illustrated, merely by
85 way of example, in the following description and with reference to the accompanying drawings. In the drawings:

Figure 1 is a perspective view of a mat in accordance with the present invention;

90 *Figure 2* is a cross-section through part of a mat in accordance with one embodiment of the present invention;

Figure 3 is a cross-section through part of a mat in accordance with another embodiment of the present
95 invention.

The stage in manufacture of the mats which comprises subjecting the assembly of the textile layer and the elastomeric layer to heat and pressure may, preferably, be carried out in either of the two
100 following ways:

- The assembled layers are introduced into an open mould so that the textile layer is in contact with the bottom of the mould, whilst the pressure applied to the elastomeric layer is provided by means of a
105 heated fluid.

- The assembled layers are introduced between the heated surfaces of a flat-bed press.

The term "textile material" is to be understood to mean any fabric, i.e. a non-woven fabric (either a
110 "flat" type or a "three-dimensional" or a "vertical" type) or a "tufted" fabric, having either a cut or an uncut pile.

The materials which constitute the textile layer can be either synthetic fibres (including acrylic fibres, polypropylene fibres, polyamide fibres and polyester fibres) or natural fibres or mixtures of synthetic and natural fibres.

In one particularly preferred embodiment of the present invention, the manufacturing process consists of the following stages:

A layer of a non-woven fabric of the "three-dimensional" type, consisting of a mixture of polypropylene and polyester fibres, having a weight of 800 g/m², and a thickness of 6 mm, is assembled
125 together with a layer of a crude elastomeric material, in particular with a layer of a mixture of crude elastomeric materials of a type, known *per se*, for making vehicle mats.

The layer of textile material is assembled together
130 with the layer of elastomeric material in an open

mould, e.g. a mould in the form of a box with one side open.

The layers are assembled together by arranging the layers of textile material to be in direct contact with the bottom of the mould or box and placing the layer of elastomeric material on top of it, completely facing the mould opening.

The mould containing the assembled layers is placed in an autoclave.

A heated pressurised fluid, e.g. steam, is introduced into the autoclave.

The pressure of the heated fluid first of all compresses the layer of textile material with a subsequent reduction in thickness and density of the said layer.

At the same time, the heat causes softening of any fibres present in the layer of textile material of which the softening temperature is equal to, or less than, that of the heated fluid present in the autoclave together with the vulcanisation of the layer of elastomeric material and mechanical anchoring of the layer of elastomeric material to the layer of textile material. It is possible that the layers of textile material assembled with the layers of elastomeric material may undergo a three-dimensional transformation during this stage.

This three-dimensional transformation of the mat is facilitated by the use of a non-woven fabric as the textile material, in that the fibres which comprise it can slide in relation to one another.

During compression of the layer of textile material, softening of some of the fibres in the said textile material, the mechanical anchoring of the layer of textile material to the layer of elastomeric material, and vulcanisation of the latter, the fibres (where present) are first softened, and then sintered. The term "sintering" is to be understood to mean a superficial union at the points of contact of the fibres which have been softened.

In accordance with the alternative embodiment of the process of the present invention, in which the pressure is applied by mechanical means to the assembled layers of textile material and elastomeric material, the said pressure is applied in a non-uniform manner in order to create a variation in density and thickness in the said layer of textile material.

Application of this non-uniform pressure to the layer of textile material is obtained by providing relief designs on the bottom of the mould (and, possibly, different reliefs at different points on the bottom of the mould) which then become moulded on the external surface of the layer of textile material.

In a further embodiment of a process in accordance with the present invention, after the stages of assembling a layer of textile material together with a layer of elastomeric material, and the vulcanisation of the latter, there follows the stage of covering the surface of elastomeric material not in contact with the textile material, with a layer of an expandable material and covering the layer of expandable material with a film of a thermoplastic material, and subsequently bringing about an expansion of the said expandable material.

In accordance with the more general embodiment of a mat for motor vehicles in accordance with the present invention the mat has a layer of a textile material assembled with, and mechanically anchored to, one layer of an elastomeric material, and preferably the layer of textile material has some of its fibres in the sintered condition (as hereinbefore defined).

Referring now to Figures 1 and 2, the mat for motor vehicles comprises a layer 1 of textile material assembled with, and anchored mechanically to, a layer 2 of vulcanised elastomeric material.

Layer 1 consists of a non-woven fabric or a tufted fabric and does not exceed 800 g/m² in weight.

The fibres comprising the textile material may be natural fibres or synthetic fibres, including acrylic fibres, polypropylene fibres, polyamide fibres and polyester fibres.

The textile material can also consist of mixtures of synthetic fibres or of mixtures of synthetic and natural fibres, either vegetable or animal.

Preferably, the textile material consists, at least in part, of synthetic fibres, the softening temperature of which is below the vulcanisation temperature of the elastomeric material. In this case, the fibres become sintered, i.e. joined together at the surface, with each fibre clearly distinguishable, thereby maintaining the textile appearance of the layer.

In addition, where mixtures of fibres are used for forming the layer of textile material, these natural and/or synthetic fibres of which the softening temperature is higher than the vulcanisation temperature of the elastomeric material, are not involved in sintering and therefore, although they remain mechanically anchored to the mass of sintered fibres, they project partly from the sintered mass, thereby increasing the textile appearance of the layer.

Surface 3 of the mat consisting of textile layer 1 has a portion 4, consisting entirely of a vulcanised elastomeric material, obtained by inserting a layer of a crude elastomeric material into an opening provided in the layer 1 of textile fabric, during that stage of the process in which the layer of textile material is assembled with the layer of elastomeric material.

Therefore, the portion 4 of vulcanised elastomeric material is stably anchored to layer 2 by vulcanisation in that vulcanisation of portion 4 and of layer 2 takes place simultaneously.

Referring now to Figure 3, the mat has a layer 5 of elastomeric material assembled with, and anchored to, a layer 6 of textile material.

The density of textile layer 6 can be varied as required for different areas of the mat by providing relief designs on surface 7 of layer 6.

Consequently, the thickness of layer 6 can vary for different parts of the mat according to the relief design on the said surface 7, with the presence, therefore, of projections 8 and 9, of varying heights and widths, which consequently influence the sound absorbance capacity of the mat.

In addition, projections 8 and 9 can have any desired configuration in order to create any textile design on the surface of the mat, such as, for example, a textile fabric of the so-called "tufted"

type.

With the process in accordance with the present invention, it is possible to reduce the number of stages hitherto necessary for the manufacture of mats for vehicles in which the mats are provided with a textile material surface, even if a layer of elastomeric material is required in some parts of the said surface.

In addition, a process in accordance with the present invention makes it possible to produce mats incorporating expanded materials, thereby to combine, in a single article, the characteristics of mats, undermats and sound-absorbent mats or of materials at present placed between the undermat and the body of a motor vehicle.

Consequently, a process in accordance with the present invention makes it possible to produce mats which can be directly applied to the body of a motor vehicle, thereby eliminating many of the operations hitherto required for fitting the mats into motor vehicles.

Finally, the mats for motor vehicles in accordance with the present invention also have a high degree of wear-resistance in that sintering of the fibres forming the textile layer of the mat means that the said fibres are strongly anchored together, thereby resisting removal of the fibres from the textile layer, and breakage of the fibres themselves.

It is to be understood that the present invention includes within its scope those mats for motor vehicles wherein the initial layer of textile material to be assembled with the layer of crude elastomeric material comprises a tufted fabric with one of its faces attached to a layer of thermoplastic material, as a result of which the mats obtained have a layer of thermoplastic material interposed between the layer of textile material and the layer of elastomeric material.

40 CLAIMS

1. A process for the manufacture of mats for motor vehicles, the process comprising the following stages:
 - 45 - assembling a layer of a textile material together with a layer of a crude elastomeric material;
 - subjecting the assembly to compression and heat in order to vulcanise the layer of crude elastomeric material.
- 50 2. A process according to Claim 1, in which during the stage of compressing the assembled layers, the heat supplied causes at least some of the fibres forming the layer of textile material to become sintered (as hereinbefore defined).
- 55 3. A process according to Claim 1 or 2, in which immediately after the stages of assembling a layer of a textile material with a layer of a crude elastomeric material, and of vulcanising the latter, there is included the stage of covering the free surface of the
 - 60 layer of elastomeric material with a layer of an expandable material, followed by covering the said expandable layer with a film of a thermoplastic material, and expanding the said expandable material.
- 65 4. A process according to any one of the preced-

ing claims, in which the pressure is applied to the layer of textile material by mechanical means.

5. A process according to any one of Claims 1 to 3, in which the pressure is applied to both layers by mechanical means.

6. A process according to Claim 1 substantially as hereinbefore described.

7. A mat for motor vehicles, manufactured by a process according to any one of the preceding

- 75 claims.

8. A mat for motor vehicles, the mat consisting of a layer of a textile material attached to a layer of an elastomeric material, in which at least some of the component fibres of the layer of textile material are

- 80 in a sintered condition (as hereinbefore defined).

9. A mat according to Claim 8, in which the layer of textile material includes fibres mechanically anchored to the sintered fibres, whereby at least some of the said mechanically-anchored fibres project from the mass of sintered fibres.

10. A mat according to Claim 8 or 9, in which the layer of textile material has areas exhibiting different degrees of compression and sintering of the component fibres.

11. A mat for motor vehicles, substantially as hereinbefore described, with reference to and as illustrated in the accompanying drawings.

Printed for Her Majesty's Stationery Office by Croydon Printing Company Limited, Croydon Surrey, 1980.
Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

